

Coluccio, Tina (DNRE)

From: Thomas, Chuck (DNRE)
Sent: Wednesday, March 10, 2010 9:43 AM
To: Coluccio, Tina (DNRE)
Subject: FW: Public comments

Humboldt File

Chuck Thomas
Ground Water Engineer
MDNRE
Upper Peninsula District Office
Phone: 906-346-8534

From: Maki, Joe (DEQ)
Sent: Thursday, January 07, 2010 12:46 PM
To: Thomas, Chuck (DEQ)
Subject: RE: Public comments

Yes and 1/15

From: Thomas, Chuck (DEQ)
Sent: Thursday, January 07, 2010 11:40 AM
To: Maki, Joe (DEQ)
Subject: RE: Public comments

Joe,

I assume you want me to provide response to all 20. When is my deadline?

Chuck Thomas
Ground Water Engineer
Water Bureau, MDEQ
Upper Peninsula District Office
Phone: 906-346-8534

From: Maki, Joe (DEQ)
Sent: Thursday, January 07, 2010 8:39 AM
To: Thomas, Chuck (DEQ)
Subject: Public comments

DEQ Geological Survey Responses to Comments, 10/17/2007

1. **Comment:** The application and permits scratch the surface of hydrogeologic features and problems, but then just ignore them. For example, the application states that the site is underlain with "weakly jointed bedrock formation" with dikes and sills and faults and that "the deformation and foliation of these rocks has served to produce a weakly jointed bedrock surface." MPA Vol. I, Appendix B. Yet, the application and permits do not discuss if or how water moves through the faults and joints. Every discussion of hydrogeology is inconclusive and qualified.

3/10/2010

Response:

2. **Comment:** The application includes only limited hydrogeologic information collected in the vicinity of the Lake. There is not enough information to assess impacts to surrounding ground and surface waters, especially given the complexities at the site. According to the application:

- The Lake created a local cone of depression to its north and south. Yet, the application predicts that once the Lake is static, it will discharge to north. Surface recharge is reportedly from the east and west flanks of the Lake, while ground water recharge is from the south of the pit. The Lake discharges through subsurface and surface seeps at its north face and drains northward to the Middle Branch of the Escanaba River.
- Depth to ground water varies from less than 10 ft below ground surface east of the mill building to greater than 30 ft near the Lake. Ground water flow at the mill is to the west and south-west and enters the Black River.

Response:

3. **Comment:** Despite the complexities, only 2 groundwater compliance wells are placed for the whole facility, and both of these are at north of the Lake. Fig 5-1, MPA Vol. I. Given the faults and joints in the underlying bedrock and ground water flow regime's complexity, this is not adequate. There appear to be only 5 ground water wells total (for compliance and monitoring combined) for the whole site.

Response:

4. **Comment:** The EIA mentions an "inference" with ground water flow direction near the Lake and "apparent" impacts and that there "appears to be a restriction of ground water flow" near the Lake. All of the qualifiers add up to show that Kennecott does not fully understand the ground water regime at the site. Therefore, the impacts from changes cannot be and have not been adequately addressed in the application.

Response:

5. **Comment:** Groundwater inflow to the HTDF has been estimated, not measured. Inflow is a measurable parameter and real data should be used. MPA, Vol. I, App. D, p. 3.

Response:

6. **Comment:** There is an absence of test wells to determine area surface and subsurface water character and conductivity as well as the complexity of gradient flow tendency. How can specific monitoring be considered accurate (representative of the affected area) without prior historical ground water data.

Response:

7. **Comment:** Hydrologic Monitoring Well Design needs to be part of application - Violates Part 632 statute and rules. This has not been done – therefore the application is not complete and the permit should not be granted.

Response:

8. **Comment:** The structural geology surrounding the majority of the disposal lake

remains an unknown.

Response:

9. **Comment:** More specifically, neither the east nor west sides of the disposal lake have received even preliminary investigations. KEMC regularly drills thousands of feet a year of cored boreholes in bedrock for mineral exploration. Yet, KEMC has not, apparently will not, drill boreholes to acquire basic bedrock information in the immediate area surrounding the disposal lake; information that has significant bearing on the viability of the disposal lake to contain the dissolved metals which have resulted and will continue to result from the disposal of metal sulfide minerals into the lake. A series of 45 degree angle borings around the disposal lake would yield considerable relevant information. However, the MDEQ must require that KEMC provide the requisite structural geology information needed to make the assertion that these are "aquitards and aquicludes".

Response:

10. **Comment:** The Community has previously noted (comments submitted to the MDEQ March 2009) the lack of structural geology maps, logs of bedrock borings or cross-sections based on borings and field mapping for the bedrock immediately adjacent to the proposed disposal lake. There is no discussion of the geologic maps, cross sections or records from the former Humboldt Iron Mine. KEMC's attempts to respond to accusations that they have not done their homework fall short of meeting the bedrock characterization requirements.

Response:

11. **Comment:** Bedrock ground water potentiometric surface and flow directions illustrated in Figure 1, Attachment 1 (KEMC to EPA) are not credible. Hydrogeology 101 teaches that a potentiometric surface can not be defined by fewer than three points. Two ground water elevation points results in an "apparent" surface and flow direction. The area in Figure 1 southeast of the disposal lake has only one well and can not possibly be used to define anything except water elevation at that one location. Using surface water elevations that are several hundred feet away is highly unreliable particularly in bedrock where ground water elevations can vary dramatically in very short distances depending on intervening rock mass structures. Any kind of structural discontinuity is likely to have a higher hydraulic conductivity and alter the ground water flow pattern.

Response:

12. **Comment:** Common sense would indicate that the potentiometric surface in Figure 1 would slope from the one known ground water elevation point (well HW-7U) above the lake down to the lake. But how can the 1540 (ft. MSL) ground water contour line follow the disposal lake shore to the north then take an abrupt turn to the east with no additional data? No additional wells? And how can the 1540, 1550, 1560 etc. ground water contour lines in this area terminate at surface water with water elevations at 1710 ft. MSL? Again, without additional data or information, this violates the most basic tenets of hydrogeology.

Response:

13. **Comment:** Since KEMC has chosen to provide no data in this area except this one well, flow direction is highly suspect. Again, without cross sections based on borehole data in these areas surrounding the disposal lake, the potentiometric surface can not be

defined nor can flow direction. These same comments regarding Kennecott's bedrock flow maps also apply to the areas west and northwest of the disposal lake. Use of residential wells for bedrock ground water elevations is notoriously unreliable compared to properly constructed piezometers or monitoring wells.

Response:

14. **Comment:** Scoping and planning of pumping test investigations to determine bedrock aquifer characteristics like hydraulic conductivity requires a basic understanding of the rock mass properties including any geologic structures like faults, breccia zones or shear zones. The lack of such an investigation calls into doubt the hydraulic properties KEMC cites in their response to EPA. In particular, the definition and application of the terms "aquitards and aquicludes" in reference to rock mass properties surrounding the Humboldt disposal lake (Humboldt Mill MPA, Vol. II, J and KEMC response to USEPA, Attach. 1, pg. 2 & 3) is not correct. These terms are used and applied assuming a certain amount of homogeneity and isotropy. Without exploration boreholes to determine rock mass properties on the east, west and south sides of the disposal lake, heterogeneity and anisotropy must be assumed since this is the normal condition of bedrock. The author of Attachment 1 as much as acknowledges this by stating a disclaimer "All definitions [referring to the application of the terms aquitards and aquicludes to Humboldt bedrock conditions] assume normal (undisturbed) hydraulic gradients." (KEMC to EPA, pg. 2) when in fact, no data have been presented to support this unlikely assumption. While homogeneous and isotropic bedrock might surround the disposal lake, KEMC needs to demonstrate this with real data or reviewers will have to assume otherwise.

Response:

15. **Comment:** The EPA shares the Community's concern regarding the claims of aquitard and aquaclude made by KEMC as stated above. "We have concerns that ground water could leave the site and gain access to surface waters. Is there fractured bedrock that would allow groundwater seepage at other locations than the proposed slurry wall?" (EPA to MDEQ). KEMC's response to this concern is unresponsive.

Response:

16. **Comment:** KEMC's response is to provide groundwater contour lines and flow directions on the east, west and south sides of the disposal lake for areas **at elevations above the lake** (text pgs. 1 & 2 and Figures 1 & 2, Attachment 1, KEMC to EPA) and claim that all flow is into the lake. This misses the point of the stated concern. Ground water seepage of contaminated water from the disposal lake will follow a gradient at elevations **below the elevation of the lake**. To address this concern, KEMC first needs to know of any fractured bedrock (faults, shear zones or other structural discontinuities) in three dimensions and secondly needs to investigate any potential discharge points in the surrounding area that may have hydraulic connection to the zone of fractured bedrock.

Response:

17. **Comment:** The foregoing discussion of the inadequacies of the Humboldt site geotechnical investigations and the questions arising from the lack of essential information indicate that the MDEQ is not, should not, be ready to issue permits for the operation of the Humboldt Mill and disposal lake. The Community remains insistent that this easily obtainable information be gathered and analyzed before such important decisions are made by the MDEQ.

Response:

18. **Comment:** Has Kennecott proven, beyond a doubt, that the tailings pit will not leak? If not, the application is incomplete. Is the DEQ aware that, contrary to Kennecott's assurances, the pit area is made up of bedrock fractured both naturally and by heavy blasting and that there are gaps in the supposedly impervious clay layer? And does the DEQ realize that similar, false claims were made by Kennecott regarding the Flambeau mine? That pit water has passed through the "slurry wall" between pit and river?

Response:

19. **Comment:** Do you have data and scientific evidence that the water will not leak from the pit? If so, could you please share with the public the evidence showing the geology of the pit and why it is that water comes into the pit, but does not leave the pit?

Response:

20. **Comment:** Are there enough groundwater compliance wells and are they placed appropriately? If you take a good look at Kennecott's Flambeau Mine, you will see that the company is very good at conveniently placing compliance zones and monitoring wells.

Response:

21. **Comment:** Why is it that in Kennecott's drawings of the Pit cross-sections they exaggerated the vertical scale by a factor of 10:1 to make the sides of the pit look MUCH steeper than they really are. Was it to enhance a perception that upper and lower waters are less likely to mix? If so that is willful deception.

Response:

22. **Comment:** Section F(12) indicates that if structural defects are found in the containment wall, it shall be stabilized "by adding fill to bolster the dike." That requirement does not go nearly far enough. If the wall has structural deficiencies, inflow to the HTDF should be halted immediately and suspended until MDEQ or a third party inspects and approves the wall's efficacy and long-term solutions are implemented. Just plugging the hole and hoping for the best are not good enough.

Response: